Names: _____ *Section_____*

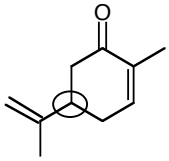
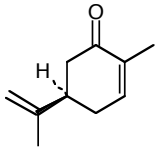
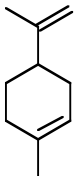
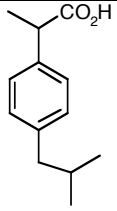
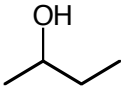
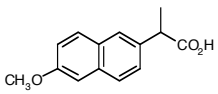
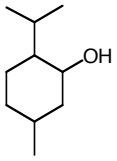
Chem 226/ Fall 2004 *Dr. Rusay*

Optical Rotation: Part II

Structure & Configuration; Refer to:

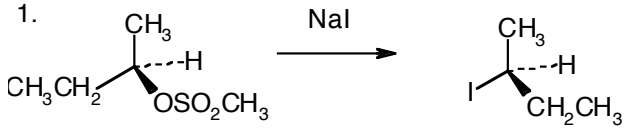
http://ep.llnl.gov/msds/orgchem/Chem226/opt-rotation-II/opt-rot-II.html

In Part II, you will examine several chiral molecules. Some are NSAIDs and others are odorants whose olfactory properties have been studied by smell panels. Complete the following table. Carvone is given as an example. Circle all of the chiral atoms in the general structure. Under comments, if it is an NSAID, indicate if the stereochemistry is the correct absolute configuration of the active drug (ACTIVE) or its enantiomer (NOT ACTIVE). If it is an odorant, list the type of smell, eg. MINT. Refer to the Web molecule page for the stereochemistry of each molecule. For smell information refer to the handout: M. Laska and P. Teubner, *Chemical Senses*, 24, 161-170 (1999) and M. Laska, *Chemical Senses*, 29, 143-152 (2004).

	Name	General Structure	Stereo Structure	Funct-ion(s)	Abs. Config	Rel. Config + or -	Comments
A	l-carvone			ketone; alkene	R-	(-)	MINT
B							
C			Fisher Drawing: 				
D			Fisher: 				
E			Fisher: 				
F							

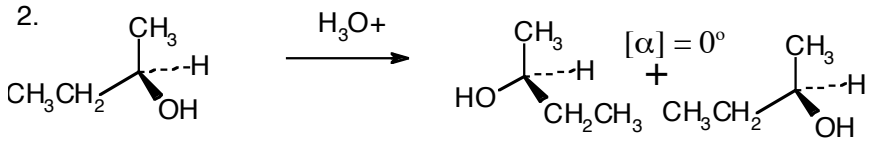
Circle each chiral carbon atom in the reactant and product(s); indicate the absolute configuration (R- or S-) next to each. If additional chiral carbons are introduced in the product(s) circle all of them and indicate R- or S- for each. Where appropriate identify enantiomers and diastereomers. For ques. #7 & #8 label the product(s) as meso, erythro or threo stereoisomers. For ques. #1-6 consider the stereochemistry of the reactant and compare it to the product(s): does the chiral center of the reactant remain the same (retention), change to the other configuration (inversion) or racemize (i.e., give a mixture of both enantomers)?

1.



retention or inversion or racemization

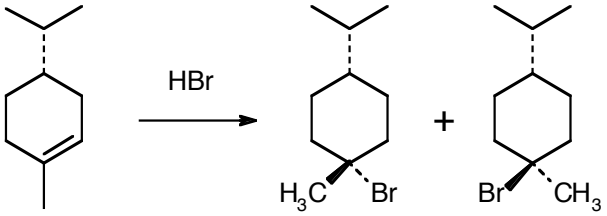
2.



[α] = -13.52°

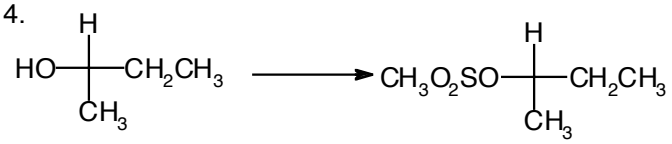
retention or inversion or racemization

3.



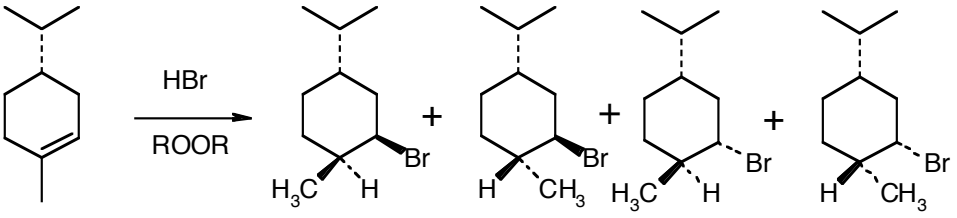
retention or inversion or racemization

4.



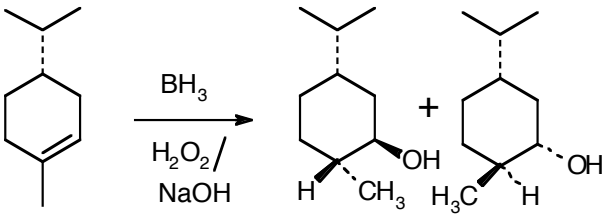
retention or inversion or racemization

5.



retention or inversion or racemization

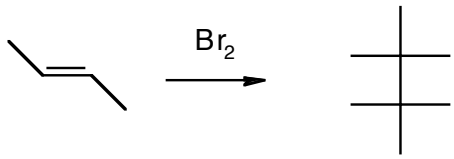
6.



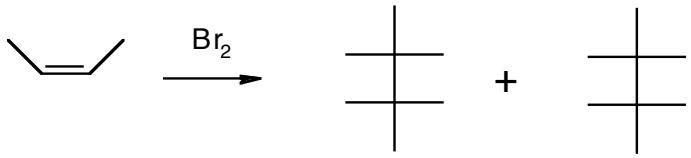
retention or inversion or racemization

For the following reactions complete the Fisher structures for the products and follow the previous instructions for identifying the products.

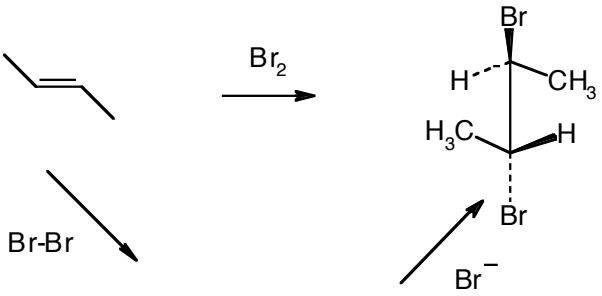
7.



8.



9. Draw the structure of the intermediate in the reaction below and show the complete mechanism using arrows.



10. Is chiral recognition by smell universal, i.e., is it possible for anyone to distinguish between the enantiomers of any chiral odor molecule? Briefly explain your answer on the basis of the published abstracts.

11. Does smell recognition appear to involve chemical functionality? Briefly discuss your answer in terms of the abstracts and the receptor model that you studied earlier. How does the model relate to the 2004 Nobel prize in Physiology? Name the recipients of the prize and where they teach.